

Two-Phase Thermal Control Technology Applications for Future Spacecraft at JPL

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Two-phase thermal control devices are being increasingly used on future JPL spacecraft and instruments. In recent years, loop heat pipes (LHP) are being used in the design of thermal control system of several JPL missions. Five LHPs will be used in TES instrument, which is scheduled for launch on EOS Chemistry platform in 2003. A miniature loop heat pipe is being incorporated as part of the rover thermal control system of Mars Exploration Rover (MER) mission which is scheduled for launch in June of 2003.

Several novel applications of miniature LHPs are being investigated for future spacecraft. One of these applications is the variable miniature loop heat pipe for Mars battery thermal control. A passive thermal control valve integrated in the LHP provides the variable conductance feature to the LHP. Another application of the LHP is its use as a thermal control bus on future microspacecraft. Besides the passive two-phase thermal control technology, active two-phase systems are also being examined. At present, these are being investigated for the removal of heat from high-density electronics and science payload of future micro/nano spacecraft.